third control is performed at the fuel cell apparatus, the precipitation of carbon from the reforming target gas can be reduced to make the fuel cells **24** less likely to deteriorate, the fuel cell apparatus can be efficiently started.

[0080] Similarly to the above description, by reducing the temperature (entrance temperature) of the reforming portion **32**, the reforming target gas supplied to the reforming portion **32** can be less likely to rapidly increase in temperature. Accordingly, by reducing the amount of reforming target gas supply to the reforming portion **32**, the heat value of the autothermal reforming in the reforming portion **32** can be reduced. Also, by reducing the amount of reforming target gas supply, the amount of heat of the combustion in one end sides of the fuel cells **24** can be reduced as well as the amount of fuel gas and unreacted gas (reforming target gas). Since rapid increase of the reforming portion **32** temperature can thus be reduced to make carbon less likely to precipitate from the reforming target gas, the fuel cells **24** can be less likely to deteriorate, and the fuel cell apparatus can be efficiently started.

[0081] For example, if the amount of reforming target gas supply is 1.5 to 4.0 L/min for the first control, the amount of reforming target gas supply for the second control or the third control can be about 70%, that is, 1.0 to 3.0 L/min, relative to the amount of reforming target gas supply for the first control. For example, when the amount of reforming target gas supply for the autothermal reforming or the steam reforming by the first control is 3.0 L/min, the amount of reforming target gas supply for the autothermal reforming by the second control or the amount of reforming target gas supply for the steam reforming by the third control can be set to 2.0 L/min.

[0082] In addition, for reducing the rapid increase of the temperature of the reforming portion **32**, the reforming portion **32** may be cooled from the outside. More specifically, the fuel cell apparatus may comprise an fuel cell-designating oxygen-containing gas supply portion that supplies an oxygen-containing gas to the fuel cells **24**, and the controller **14** controls the fuel cell-designating oxygen-containing gas supply portion so that the amount of oxygen-containing gas supplied to the fuel cells **24** for the autothermal reforming by the second control is larger than that for the autothermal reforming by the first control, and so that the amount of oxygen-containing gas supplied to the fuel cells **24** for the steam reforming by the third control is larger than that for the steam reforming by the first control. Thus, the reforming portion **32** can be less likely to rapidly increase in temperature. Since the precipitation of carbon in the reforming target gas is thus reduced, the fuel cells **24** can be less likely to deteriorate. Preferably, from the viewpoint of miniaturizing the fuel cell apparatus, the oxygen-containing gas supply portion for the fuel cells doubles as the oxygen-containing gas supply portion **3** supplying the oxygen-containing gas to the reforming portion **32** (vaporizing portion **31**).

[0083] When, for example, the amount of fuel cell-designating oxygen-containing gas supply is 20 to 60 L/min for the first control, the fuel cell-designating oxygen-containing gas supply for the second or third control can be 30 to 80 L/min. Accordingly, when the amount of fuel cell-designating oxygen-containing gas supply is 50 L/min for the autothermal reforming or steam reforming by the first control, the amount of fuel cell-designating oxygen-containing gas supply for the autothermal reforming by the second control or for the steam reforming by the third control can be 60 L/min.

[0084] Although the present invention has been described in detail, the invention is not limited to the above-described embodiment, and various modifications may be made without departing from the scope and spirit of the invention.

[0085] For example, the controller **14** may perform two or more of the controls of the amounts as described above at one time. This can reduce the precipitation of carbon from the reforming target gas and further make the reforming catalyst **34** less likely to deteriorate.

[0086] The method of controlling the fuel cell apparatus described above performs a first control, a second control or a third control according to the reforming portion temperature at the starting time of the fuel cell apparatus. The first control performs a reforming reaction in the reforming portion in the order of partial oxidation reforming, autothermal reforming and steam reforming. The second control performs autothermal reforming and steam reforming in that order, and the third control performs steam reforming. Such controls can reduce rapid increase of the temperature of the reforming target gas supplied to the reforming portion and thus can make carbon in the reforming target gas less likely to precipitate even if the reforming portion at the starting time of the fuel cell apparatus has a temperature at which steam reforming can be performed. Consequently, the fuel cells can be less likely to deteriorate, and the fuel cell apparatus can be efficiently started. In addition, since the second control and the third control start the reforming reaction from the autothermal reforming or the steam reforming without performing partial oxidation reforming, the reforming portion can be less likely to come to high temperature at the starting time of fuel cell apparatus. The reforming catalyst thus can be less likely to deteriorate.

[0087] The present invention can be embodied in various forms without departing from the spirit and principal features of the invention. The above-disclosed embodiment is only one version of the invention at all points. The scope of the present invention is specified in the attached claims, and is not restrained by the above description of the specification. All the modifications and variations made within the scope of the claims are within the scope of the present invention.

1. A method for controlling a reforming reaction with a fuel cell apparatus, comprising:

measuring a temperature of a reforming portion in the fuel cell apparatus at the starting time of the fuel cell apparatus;

measuring a temperature of a vaporizing portion in the fuel cell apparatus at the starting time of the fuel cell apparatus;

performing a first reforming reaction in which partial oxidation reforming, autothermal reforming and steam reforming are performed in that order as the reforming reaction when the temperature of the reforming portion is lower than T**1**, where T**1** represents a temperature at which the steam reforming can be performed;

performing a second reforming reaction in which autothermal reforming and steam reforming are performed in that order as the reforming reaction when the temperature of the reforming portion is not lower than T**1** and the temperature of the vaporizing portion is lower than T**2**, where T**2** represents a temperature at which a predetermined amount of steam can be generated by the steam reforming; and

performing a third reforming reaction in which steam reforming is performed as the reforming reaction when